

**APOPYROS (ASTERACEAE: ASTEREA), A NEW GENUS FROM
SOUTHERN BRAZIL, ARGENTINA, AND PARAGUAY**

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ABSTRACT

Two species of southern Brazil and adjacent Paraguay and Argentina, formerly identified as *Aster* and *Conyza*, are here treated as *Apopyros* Nesom, *gen. nov.*, with the new combinations *Apopyros warmingii* (Baker) Nesom and *Apopyros corymbosus* (Hook. & Arn.) Nesom. *Apopyros* is hypothesized to be most closely related to species of three other genera with a similar austro-brasilien geographic distribution in east-central South America: *Leptostelma*, *Neja*, and *Hysterionica*. In their parallel-veined leaves with shiny-indurate surfaces, multinerved, nearly terete achenes, and tendency to produce stiffly pilose-hirsute vestiture, *Neja* and *Apopyros* are distinctive among their close relatives.

KEY WORDS: *Apopyros*, *Aster*, Asteraceae, Astereae, South America

Aster warmingii Baker and *Diplopappus corymbosus* Hook. & Arn. (= *Aster tuberosus* Less. = *Aster setosus* Baker = *Conyza blanchetii* Baker, see below) are perennial herbs endemic to south-central Brazil, where at least the first species has often been encountered in periodically burned cerrados. *Aster warmingii* was described after Bentham's systematic overview of the tribe (1873), and neither species was specifically included in Hoffmann's subsequent review of the tribe (1890). Nor, apparently, has either been subject to any other critical taxonomic evaluation since their first recognition. Clearly, they do not belong with any group of *Aster*, even in the broadest sense of that genus (Nesom in prep.). In the interpretation here, *Aster warmingii* and *D. corymbosus* are recognized as a separate genus closely related to three other genera that occur in the same region of east-central South America: *Leptostelma* D. Don (Nesom in press), *Neja* D. Don (Nesom 1994), and *Hysterionica* Willd.

Apopyros Nesom, *gen. nov.* Type species: *Apopyros (Aster) warmingii* (Baker) Nesom.

Caulibus strictis rhizomate ligneo vel tubere exorientibus, foliis caulinis stricte erectis 3(5)-nervatis, valde redactis squamoideisque prope basim caulis, capitulis discoideis, phyllariis uninervatis, floribus pistillatis marginibus corollis inter corollas typicas radii ac disci intermediis, acheniis plerumque 5-nervatis paene cylindricis ad apicem truncatis, et pappo setarum numerosarum serie brevi exteriore carenti dignoscenda.

Herbaceous perennials, eglandular, stiffly pilose-hirsute with Type A trichomes (designation of trichome types follows Nesom 1976) to nearly glabrous, strigillose with Type B trichomes in *Apopyros warmingii*; stems strictly erect, arising from a thick, woody rhizome or tuber. Leaves all cauline, stiffly erect, shiny-indurate in texture, glabrous to stiffly hirsute-pilose, epetiolate, entire, 3(-5)-nerved, those near the stem base reduced and scale-like. Heads disciform, solitary or in a paniculate-corymboid capitulescence; receptacles smooth or alveolate, epaleate; phyllaries with a single, thickened and raised, orange-resinous vein, the cells of the central area minutely but distinctly quadrate. Pistillate flowers fertile, peripheral, the corollas essentially tubular, orange-veined, eligulate but with 3-4 triangular teeth, approaching the disc corollas in morphology but the style branch morphology typical of the pistillate flowers, with lateral stigmatic lines from base to apex. Disc flowers bisexual, fertile, orange-nerved, the veins continuous through the throat, narrowly tubular, 5-lobed, slightly expanded at the throat into the limb, not indurate, abruptly expanded at the very base into a wide, indurate disc; style branches short, with mostly deltate collecting appendages; anthers with white apical appendages 0.6-0.8 mm long, filaments inserted ca. 1 mm above the base of the corolla at the tube-throat junction. Achenes mostly with 5 vascularized nerves, these orange-resinous when young but becoming lighter colored at maturity, nearly cylindric, 1.8-4.0 mm long, oblong in side view, the faces tan, moderate strigose with duplex hairs (Zwillingshaare), eglandular, apically truncate (without shoulders, the nerves parallel); carpodium 2-3 cells high; pappus of (1-)2 series of numerous, apically attenuate bristles of even length, with or without an additional, short, outer series of setae. Chromosome number not reported.

The name of the genus refers to the distinctive habit of the plants, especially *Apopyros warmingii*, in sending up leafy, flowering stems after a fire, sometimes as quickly as one month after the burn.

KEY TO THE SPECIES

1. Heads 7-9 mm wide, numerous in a corymboid panicle; midstem leaves not clasping, 3-6 cm long, 2-8 mm wide; disc flowers 3.5-4.5 mm long; achenes 1.8-2.2 mm long; pappus usually with a short, outer series of setae or setose bristles. *A. corymbosus*
1. Heads 10-14 mm wide, solitary or few; midstem leaves subclasping, 4-7 cm long, 10-15 mm wide; disc flowers 4.5-5.8 mm long; achenes 3-4 mm long; pappus without a short, outer series. *A. warmingii*

1. **Apopyros corymbosus** (Hook. & Arn.) Nesom, *comb. nov.* BASIONYM: *Diplopappus corymbosus* Hook. & Arn., *Compan. Bot. Mag.* 2:48. 1836. TYPE: BRAZIL. Rio Grande do Sul: *Tweedie s.n.* (K?).

Aster tuberosus Less. [*in sched.*] ex Baker in Martius, *Fl. Bras.* 6(3):22. 1882. SYNTYPES (as cited by Baker): BRAZIL. Prov. Rio Grande do Sul: *Tweedie s.n.* (K?); Brasilia australi, sine loci designatione, *Sello 2450* (B). A Sello specimen (B photo-GH!, photo-MO!) is annotated by Lessing as "*Aster tuberosus* n. sp." and may represent type material; the number "14888" is written on the photographic scale ruler but there is no other number on the specimen itself.

Aster setosus Baker in Martius, *Fl. Bras.* 6(3):22. 1882. *Conyza setosa* (Baker) Malme, *Arkiv. Bot.* 24A(6):50. 1931. TYPE: BRAZIL. Brasilia australi, sine loci designatione, *Sello 907* (?).

Conyza blanchetii Baker in Martius, *Fl. Bras.* 6(3):36. 1882. TYPE: BRAZIL. Bahia: in campis ad Igreja Velha, *Blanchet 3316* (HOLOTYPE: BM photo-GH!; Isotypes: B photo-GH!, GH!, MO, P photo-GH!, US!). *Erigeron blanchetii* Sch.-Bip. [*in sched.*] ex Baker [*pro syn.*] in Martius, *Fl. Bras.* 6(3):36. 1882. Homotypic with *Conyza blanchetii*, the P specimen annotated by Schultz as "*Erigeron blanchetii*."

Perennial herbs from a thick, ligneous, sometimes tuberous rhizome; stems 5-7 dm tall, single from the base, sparsely pilose-hirsute with stiffly spreading Type A trichomes, eglandular. Leaves all cauline, the lowermost scale-like, more or less densely arranged on the stem above the base, shiny-indurate in texture, strictly ascending, linear-lanceolate to narrowly elliptic, 3-6 cm long, 2-8 mm wide at midstem, sessile, not clasping, with entire, stiffly spreading-ciliate margins, the lamina glabrous or stiffly hirsute-pilose, 3-veined from the base, the midvein raised, the lateral veins becoming diffuse in the distal portion of the leaf, upper leaves strongly reduced in size and density toward

and within the capitulescence. Capitulescence a loose but distinct, terminal corymboid panicle of 15-75 heads, the initial heads overtopped by those on lateral branches. Heads 7-9 mm wide (pressed), phyllaries narrowly elliptic oblanceolate, in 3-4 graduated series, the inner 4-5 mm long, outermost 1/3-1/4 as long as the inner, with thick, broad orange-resinous midvein extending to the very apex, margins narrowly thin-hyaline; receptacles slightly convex, distinctly alveolate. Pistillate flowers numerous, the tube 3.0-3.5 mm long. Disc flowers 3.5-4.5 mm long, the tube ca. 1 mm long and distinctly broadened at the very base, slightly but abruptly opening into the limb, the lobes deltate to shallowly triangular; style branches 0.5 mm long, the collecting appendages very shallowly triangular to shallowly deltate; achenes 1.8-2.2 mm long, 5-nerved; pappus of (1-)2 series of 28-38 bristles and shorter, outer series of few setae, the bristles sometimes reddish-brown on the distal 2/3.

Additional specimens examined: ARGENTINA. Prov. Corrientes: Dep. Empedrado, Estancia "Las Tres Marias," 24 Apr 1956, *Pedersen 3901* (GH); Dep. Concepción, Rincón de Luna, Estancia Borvil, 26 Feb 1957, *Pedersen 4478* (GH); Dep. Santo Tomás, Estancia "Garruchos," 12 Feb 1960, *Pedersen 5421* (GH).

PARAGUAY. Caaguazu: [no date or other data], *Hassler 9222* (GH).

Apopyros corymbosus has been collected in south-central Brazil (Rio Grande do Sul) and adjacent Argentina and Paraguay. The type collections of *Conyza blanchetii* is from the state of Bahia, considerably north of the other localities noted here, but there is no significant difference between these plants and those from more southern localities. The specimens I have studied of *A. corymbosus* were collected in flower from February to May. Several Brazilian distribution records (Map 1) have been added from citations of *Conyza setosa* by Malme (1931, 1933).

Baker (1882) distinguished *Aster tuberosus* from *A. setosus* on the basis of hairiness of the latter, but the vestiture in this species is variable in density. It is not clear why Baker included these two species within *Aster* apart from *Conyza blanchetii*, because his key to genera distinguishes *Aster* from *Conyza* by "Ligulae latae" (*Aster*) vs. "Capitula semper discoidea" (*Conyza*).

2. **Apopyros warmingii** (Baker) Nesom, *comb. nov.* BASIONYM: *Aster warmingii* Baker in Martius, *Fl. Bras.* 6(3):23. 1882. LECTOTYPE (designated here): BRAZIL. Prov. Minas Gerais: in campis ad Lagoa Santa, 25 Oct 1864, *E. Warming 550* (C, photo-GH!, photo-MO!, photo-US!).

Two sheets of this at C are both clearly annotated as "*Aster warmingii* Baker sp. nov." and the identity of the plants on both sheets is unequivocal. Both have the same printed label but one



Map 1. Distribution of *Apopyros corymbosus* and *A. warmingii*.

(*Warming s.n.*) has a date of 9 Nov 1863 handwritten on the printed label; the other (*Warming 550*) has a date of 25 Oct 1864 written on an accompanying slip of paper.

Plants from a thick, lignescent rhizome, the latter sometimes thickening up to 4 cm wide and cormoid or broadly tuberous; leaves, stems, and phyllaries with stomates distinctly visible, appearing glabrous or glabrate but under close inspection the leaves minutely and inconspicuously strigillose with Type B trichomes. Stems mostly several (rarely 1 or up to 30) from the base, 2-6 dm tall, strictly erect, unbranched or with a few branches above midstem, with numerous narrow ribs. Leaves thick, elliptic to narrowly lanceolate, epetiolate, subclasping, 4-7 cm long, 10-15 mm wide, largest at midstem, gradually diminished upward, bracteate immediately beneath the heads, also reduced in size downward with the lowermost nearly scale-like, margins with a sharply delimited, narrow, thickened-hyaline rim, antrorsely ciliate with Type A trichomes 0.2-0.5 mm long, the leaf surfaces sometimes sparsely strigose with similar trichomes. Heads 10-14 mm wide (pressed), 1-4 per main stem on peduncles 1.5-8.0 cm long; phyllaries linear-lanceolate, in 3-4 series, the inner 6-8 mm long, outermost 1/3-5/6 as long as the inner, with an orange-resinous, fleshy-thickened and raised midrib, green lateral areas from near base to apex, and sharply delimited, hyaline, shallowly lacerate-erose margins. Pistillate flowers few. Disc flowers 4.5-5.8 mm long, abruptly expanded into a wide, indurate disc at the very base; style branches 1.0-1.2 mm long, with deltate collecting appendages 0.1-0.2 mm long. Achenes nearly terete or plump-angular in cross-section, with (4-)5(-6) yellowish nerves, 3-4 mm long, 0.6-1.0 mm wide; pappus of (1-)2 series of ca. 30-40 whitish bristles, without a short, outer series.

Apopyros warmingii is endemic to south-central Brazil, where it has most commonly been collected in areas of recently burned cerrado at elevations of ca. 300-1000 meters. It flowers at least from August through February.

Specimens examined: BRAZIL. Distrito Federal: Brasilia, area do Cristo Redentor, 15°57'07" S 47°53'37" W, area queimada recentemente, brejo seco periodicamente, 19 Oct 1988, *Azevedo 181* (US); Brasilia, Campus da Universidade de Brasilia, cerrado, 3 Feb 1968, *Belem 3922* (US); Brasilia, Taguatinga, confluencia correjos Cana do Reino & Vicente Pires, 25 Aug 1981, *Heringer et al. 7356* (US); ca. 10 km E of Brasilia, gallery forest and adjacent burned cerrado, Corrego Jeriva, 975 m, 15 Sep 1965, *Irwin et al. 8329* (US); cerrado adjacencias do Corrego Rajadinha, Bacia do rio São Bartolomeu, local queimado ha cerca de 30 dias, 5 Oct 1983, *Pereira 815* (US). Goias: Serra do Caiapo, 17°12' S, 51°47' W, ca. 30 km N of Jatai on road to Caiaponia, 800-1000 m, 24 Oct 1964, *Irwin et al. 7310* (US) and *7283* (MO,US). Matto Grosso: ca. 70 km N of Xavantina, 14°40' S 52°20' W, burned-over cerrado, 300-400 m, 10 Oct 1964, *Irwin & Soderstrom 6721* (US); Rio Arinos, braco, 26 Sep 1943, *Baldwin 3069* (US). Minas Gerais: Mpio. de Prata, 27 km S of Prata

on Hwy BR-14, Triangulo Mineiro region, open xeromorphic scrub-savanna, 29 Sep 1967, *Goodland 4010* (MO).

DEFINITION AND RELATIONSHIPS OF *APOPYROS*

Plants of *Apopyros* are briefly characterized as follows: stems strictly erect, arising from a thick, woody rhizome or tuber; leaves all cauline, stiffly erect-ascending, shiny-indurate in texture, 3(-5)-nerved, those near the stem base reduced and sometimes scale-like; heads disciform, the pistillate flowers 1-seriate, peripheral, tubular with 3-4 apical teeth, eligulate; phyllaries with a single, distally broadened, thickened and raised, orange-resinous vein; achenes mostly 5-nerved, oblong and nearly terete; and pappus of (1-)2 series of numerous bristles of even length, with or without an additional, short, outer series of setae or setose bristles.

Apopyros corymbosus resembles *Conyza* in its numerous, small heads with reduced pistillate corollas, and it is easy to understand why this species has been referred to *Conyza*. Malme's transfer of *Aster setosa* to *Conyza* was explicitly based on his recognition of its similarity to *C. blanchetii*. *Conyza* differs from *Apopyros*, however, in its net-veined leaves, the surface texture not shiny-indurate; phyllaries most commonly 3-nerved; pistillate flowers in several series, with a short ligule or if eligulate, the apex of the tube usually truncate or fimbriate, not distinctly toothed; achenes flattened and 2-nerved; and pappus usually 1-seriate, without a short, outer series.

Presumably, these species were allied with *Aster* because of a convergent resemblance (Nesom in prep.) to species of *Aster* subg. *Oxytripolium* that occur in the same geographic area (e.g., *Aster squamatus* [Spreng.] Hieron., *A. regnellii* Baker). The phyllaries of these species, however, lack orange venation, the leaf texture and vestiture are different, the pistillate flowers are ligulate, and the pappus is uniseriate.

Apopyros is a member of the "*Leptostelma* group" (as noted in other studies: Nesom 1994, in press, and in prep.), which also includes *Leptostelma*, *Hysterionica*, and *Neja*. The plants of these genera are characterized by the following features: leaves often thick or rigid; phyllaries flat, more or less evenly herbaceous, and commonly 3-nerved, the nerves usually conspicuously orange-resinous; rays mostly 2-3-seriate, the ligules variably (between species) yellow or white, but often tending to dry yellowish even if white when fresh; disc corollas with a short tube; disc flowers bisexual and fully fertile, the style branches short, with deltate collecting appendages; achenes eglandular, erostate, flat and 2-nerved (or terete and multinerved in *Apopyros* and *Neja*); and pappus 1-3-seriate, the outer series of bristles similar to the inner or variably usually reduced and modified. All have an "austro-brasilien" geographic distribution, occurring primarily in southeastern Brazil and adjacent Argentina, Uruguay, Paraguay, and Bolivia.

Several specimens of *Apopyros warmingii* have been annotated by Dr. Harold Robinson as "a rayless form of *Erigeron tweediei*" (= *Leptostelma tweediei* [Hook. & Arn.] Nesom). If it were necessary to fit *Apopyros* into a previously established genus, *Leptostelma* is reasonably considered, as plants of the latter tend to be relatively similar in habit, disc corolla and style branch morphology and in their similar habitats in the same geographic region. On the other hand, the nearly cylindrical, multinerved achenes of *Apopyros* would be anomalous within *Leptostelma*, derived with difficulty (at least conceptually) from the flattened, oblong-obovate, and 2-nerved ones of *Leptostelma*. Further, *Leptostelma* produces fibrous-rooted rhizomes, net-veined leaves, 3-veined phyllaries, ligulate pistillate flowers, and foveolate receptacles. If positioned as a member of *Leptostelma*, the two species of *Apopyros* would occupy an isolated position coordinate with the rest of the genus.

Apopyros and *Neja* are similar (and perhaps most closely related to each other) in their terete to subterete, multinerved achenes, parallel-veined leaves with shiny-indurate surfaces, and stiffly pilose-hirsute vestiture. *Neja* differs in its branching, lignescent caudices, filiform, basally disposed leaves, solitary heads on nearly scapose stems, conspicuously ligulate pistillate flowers, and fusiform-cylindrical achenes with 7-10 raised, longitudinal nerves that are thick, raised, and orange-resinous at maturity.

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